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INTEL CORPORATION  
P.O. BOX 5326  
SANTA CLARA, CA 95056-5326

EXAMINER

YANCHUS III, PAUL B

ART UNIT PAPER NUMBER

2116

DATE MAILED: 10/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/994,982

Applicant(s)

DAI, XIA

Examiner

Paul B Yanchus

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 August 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 8/18/03, 4/28/03
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 10-12, 15, 16, 18 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Noble et al., US Patent no. 5,760,636 [Noble]<sup>1</sup>.

Regarding claim 1, Noble teaches a component comprising:

a clock generator [Clock in Figure 1] to switch from a first clock frequency [high clock frequency] to a second clock frequency [lower clock frequency] while the component is in a sleep state [processor is halted], the switch from the first to the second clock frequency to be associated with a transition between a high performance state [normal operation mode] and a low power state [low power mode, column 5, lines 27-34 and 41-49]; and

a core [Voltage Regulator in Figure 1] to receive a voltage to switch from a first voltage level [high voltage] to a second voltage level [low voltage] while the component is in an active mode, the switch from the first voltage level to the second voltage level to be associated with the transition between the high performance state and the low power state [column 5, lines 60-67].

Regarding claim 2, Noble teaches that the processor is halted during a change in operating frequency. When a processor is halted, the processor does not execute instructions, but power is still supplied to the processor. Since power is still being provided to the processor

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<sup>1</sup> Included in IDS filed on 4/28/03

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during a change in operating frequency, the contents in the processor cache will be maintained during the frequency transition.

Regarding claim 3, Noble teaches adjusting the operating frequency to reduce the power consumed by a processor or other integrated circuit in a computer system [column 2, lines 49-52].

Regarding claim 4, Noble teaches that the component executes instructions when the processor is in an active mode [column 5, lines 39-41].

Regarding claim 5, the C0 state, as defined in the Applicant's specification, is defined as a state in which a processor executes its functions in a normal power level. Noble teaches that the processor executes instructions when the processor is in an active mode [column 5, lines 39-41].

Regarding claim 10, Noble teaches a system comprising:

a component [Clock in Figure 1] to switch its clock frequency from a first clock frequency [high clock frequency] to a second clock frequency [lower clock frequency] while the component is in a sleep state [processor is halted], the switch from the first to the second clock frequency to be associated with a transition between a high performance state [normal operation mode] and a low power state [low power mode, column 5, lines 27-34 and 41-49]; and

a voltage regulator [Voltage Regulator in Figure 1] to switch a core voltage to the component from a first voltage level [high voltage] to a second voltage level [low voltage] while the component is in an active mode, the switch from the first to the second voltage level to be associated with the transition between the high performance state and the low power state [column 5, lines 60-67].

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Regarding claim 11, Noble teaches that the processor is halted during a change in operating frequency. When a processor is halted, the processor does not execute instructions, but power is still supplied to the processor. Since power is still being provided to the processor during a change in operating frequency, the contents in the processor cache will be maintained during the frequency transition.

Regarding claim 12, Noble teaches adjusting the operating frequency to reduce the power consumed by a processor or other integrated circuit in a computer system [column 2, lines 49-52].

Regarding claim 15, Noble teaches a method comprising:

switching a clock generator [Clock in Figure 1] of a component from a first clock frequency [high clock frequency] to a second clock frequency [lower clock frequency] while the component is in a sleep state [processor is halted], the switch from the first to the second clock frequency associated with a transition between a high performance state [normal operation mode] and a low power state [low power mode, column 5, lines 27-34 and 41-49]; and

switching a core voltage [Voltage in Figure 1] from a first voltage level [high voltage] to a second voltage level [low voltage] while the component is in an active mode, the switch from the first voltage level to the second voltage level associated with the transition between the high performance state and the low power state [column 5, lines 60-67].

Regarding claim 16, Noble teaches that the processor is halted during a change in operating frequency. When a processor is halted, the processor does not execute instructions, but power is still supplied to the processor. Since power is still being provided to the processor

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during a change in operating frequency, the contents in the processor cache will be maintained during the frequency transition.

Regarding claim 18, Noble teaches a machine-readable medium including machine-readable instructions that, if executed by a computer system, cause the computer system to perform a method comprising:

switching a clock generator [Clock in Figure 1] of a component from a first clock frequency [high clock frequency] to a second clock frequency [lower clock frequency] while the component is in a sleep state [processor is halted], the switch from the first to the second clock frequency associated with a transition between a high performance state [normal operation mode] and a low power state [low power mode, column 5, lines 27-34 and 41-49]; and

switching a core voltage [Voltage in Figure 1] from a first voltage level [high voltage] to a second voltage level [low voltage] while the component is in an active mode, the switch from the first voltage level to the second voltage level associated with the transition between the high performance state and the low power state [column 5, lines 60-67].

Regarding claim 19, Noble teaches that the processor is halted during a change in operating frequency. When a processor is halted, the processor does not execute instructions, but power is still supplied to the processor. Since power is still being provided to the processor during a change in operating frequency, the contents in the processor cache will be maintained during the frequency transition.

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Claims 6, 7 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Gebara et al., US Patent no. 6,035,407 [Gebara].

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Regarding claim 6, Gebara teaches a voltage regulator comprising:

an output to provide a voltage at a first voltage level [ $V_{CCP}$  in Figure 11];

an input to receive a signal to indicate that the voltage is to switch to a second voltage level [column 7, line 64 – column 8, line 9]; and

a component to switch the voltage from the first voltage level to the second voltage level in a stepwise ramp [column 8, lines 56-60].

Regarding claim 7, Gebara teaches a table representation associated with the ramp that specifies that the voltage will be adjusted by a predetermined amount at intervals of a predetermined amount of time [column 8, lines 56-60].

Regarding claim 9, Gebara teaches that the signal further indicates the second voltage level [column 7, line 64 – column 8, line 9].

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gebara et al., US Patent no. 6,035,407 [Gebara].

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Regarding claim 8, Gebara does not specifically disclose ramping the voltage in 25-50mV steps. However, Gebara does disclose gradually ramping the voltage in steps of a predetermined size and gives an example size of 100mV. It would have been obvious to one of

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ordinary skill in the art to reduce the voltage step size from 100mV to 25-50mV. One would be motivated enable a more gradual change from the first voltage level to the second voltage level to prevent overvoltage or undervoltage tracking circuitry from being falsely activated [column 8, lines 60-63].

Claims 13-14, 17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noble et al., US Patent no. 5,760,636 [Noble]<sup>2</sup>, in view of, Gebara et al., US Patent no. 6,035,407 [Gebara].

Regarding claims 13, 17 and 20, Noble, as described above, teaches a voltage regulator for adjusting the voltage supplied to a computer system component. Noble does not explicitly disclose how the voltage regulator adjusts the voltage supplied to the computer system component. Gebara teaches a table representation associated with a stepwise ramp that specifies that the voltage level will be adjusted by a predetermined amount of voltage at intervals of a predetermined amount of time [column 8, lines 56-60]. One would be motivated to use the Gebara voltage regulator in the Noble system to gradually adjust the voltage supplied to the computer system component in order to prevent the voltage regulator overvoltage or undervoltage circuitry from being falsely activated [Gebara, column 8, lines 60-63].

Regarding claim 14, Gebara does not specifically disclose ramping the voltage in 25-50mV steps. However, Gebara does disclose gradually ramping the voltage in steps of a predetermined size and gives an example size of 100mV. It would have been obvious to one of ordinary skill in the art to reduce the voltage step size from 100mV to 25-50mV. One would be

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<sup>2</sup> Included in IDS filed on 4/28/03



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motivated enable a more gradual change from the first voltage level to the second voltage level to prevent overvoltage or undervoltage tracking circuitry from being falsely activated [column 8, lines 60-63].

### *Conclusion*

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Zdravkovic, US Patent no. 6,715,089, teaches a method for reducing power consumption of a graphics processor.

Hewitt et al., US Patent no. 6,085,330 teaches that the ACPI specification defines the C0 state to occur when the CPU is in a fully operational state.

Edme, US Patent no. 5,175,706, teaches discloses gradually ramping a voltage when transitioning from a first voltage level to a second voltage level.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul B Yanchus whose telephone number is (703) 305-8022. The examiner can normally be reached on Mon-Thurs 8:00-6:00.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne H Browne can be reached on (703) 308-1159. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Paul Yanchus  
September 28, 2004

  
LYNNE H. BROWNE  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 3600-2100